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#### Citation for published version:

Speed, C & Burke, ME 2012, 'Knowledge Recovery: Applications of Technology and Memory'. in K Michael & MG Michael (eds), *Ubervveillance and the Social Implications of Microchip Implants: Emerging Technologies*. IGI Global., 10.4018/978-1-4666-4582-0.ch005

#### Digital Object Identifier (DOI):

[10.4018/978-1-4666-4582-0.ch005](https://doi.org/10.4018/978-1-4666-4582-0.ch005)

#### Link:

[Link to publication record in Edinburgh Research Explorer](#)

#### Document Version:

Preprint (usually an early version)

#### Published In:

*Ubervveillance and the Social Implications of Microchip Implants*

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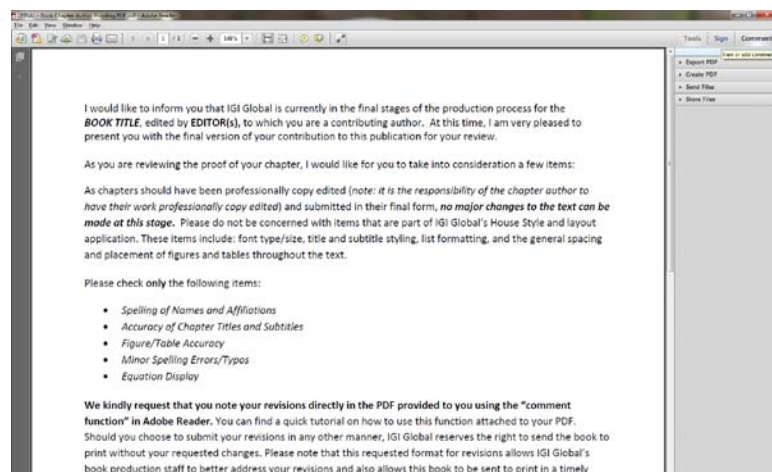
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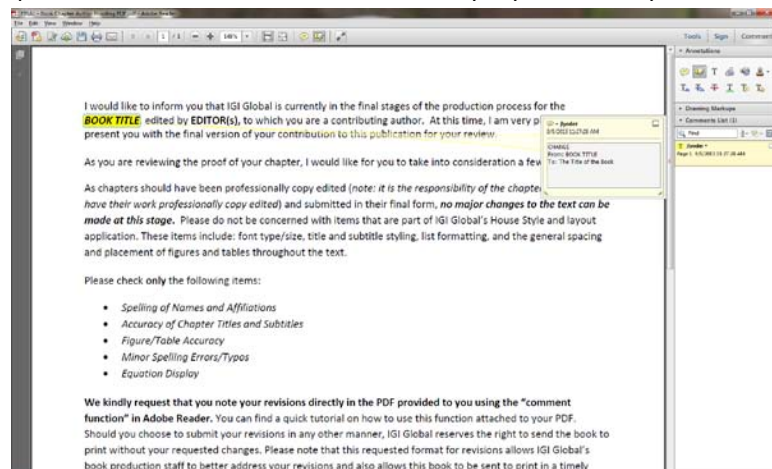
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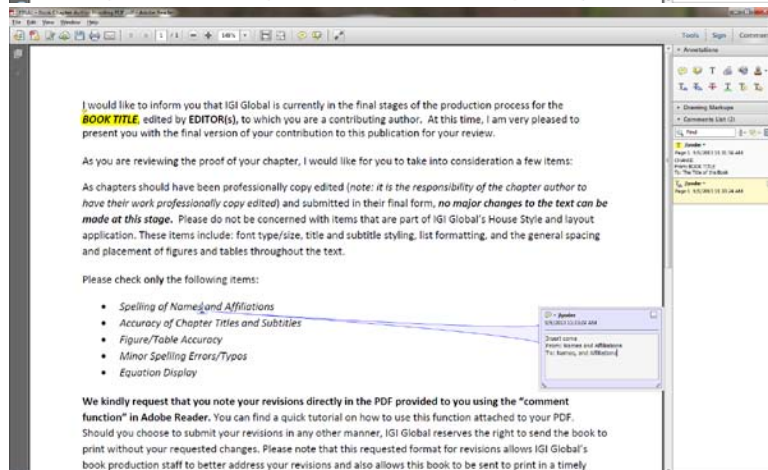
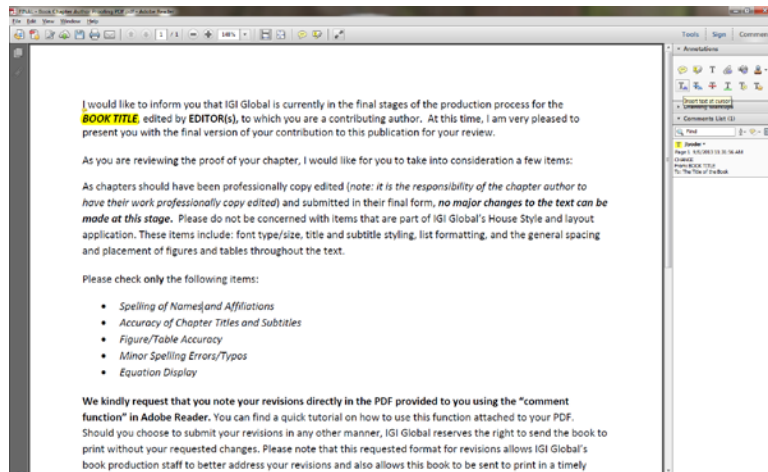
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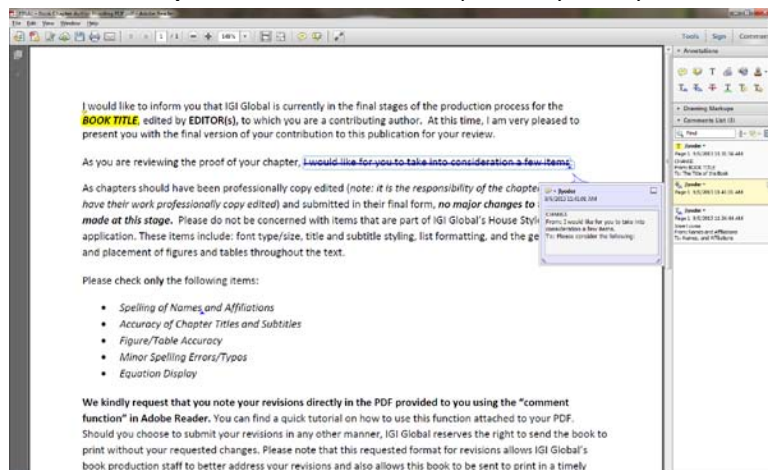
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# Ubervveillance and the Social Implications of Microchip Implants: Emerging Technologies

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A volume in the Advances in Human and  
Social Aspects of Technology (AHSAT)  
Book Series

**Information Science**  
**REFERENCE**

An Imprint of IGI Global

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When or how *uberveillance* will be implemented in its full-blown manifestation is still a subject for some intriguing discussion and a topic of robust disagreement, but what is generally accepted by most of the interlocutors is that an “uberveillance society” will emerge sooner rather than later, and that one way or another this will mean an immense upheaval in all of our societal, business, and government relationships. What is apparent from the numerous qualitative and quantitative studies conducted is that microchipping people is a discernibly divisive issue. If we continue on the current trajectory, we will soon see further divisions – not just between those who have access to the Internet and those who do not, but between those who subjugate themselves to be physically connected to the Web of Things and People, and those who are content enough to simply have Internet connectivity through external devices like smart phones, to those who opt to live completely off the grid. Time will only tell how we as human-beings will adapt after we willingly adopt innovations with extreme and irreversible operations. This introduction serves to provide a background context for the term uberveillance, which has received significant international attention since its establishment.

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CAMERAS” and “NO CELLPHONES IN STORE, PLEASE!” signage. The authors consider the chilling effect of this veillance hypocrisy on LifeGlogging, wearable computing, “Sixth Sense,” AR Glass, and the Digital Eye Glass vision aid. If surveillance gives rise to hypocrisy, then to what does its inverse, sousveillance (wearable cameras, AR Glass, etc.), give rise? The opposite (antonym) of *hypocrisy* is *integrity*. How might we resolve the conflict-of-interest that arises in situations where, for example, police surveillance cameras capture the only record of wrongdoing by the police? Is sousveillance the answer or will centralized dataveillance merely turn sousveillance into a corruptible *uberveillance* authority?

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The ability to “write” data to the Internet via tags and barcodes offers a context in which objects will increasingly become a natural extension of the Web, and as ready as the public was to adopt cloud-based services to store address books, documents, photos, and videos, it is likely that we will begin associat-



ing data with objects. Leaving messages for loved ones on a tea cup, listening to a story left on a family heirloom, or associating a message with an object to be passed on to a stranger. Using objects as tangible links to data and content on the Internet is predicted to become a significant means of how we interact with the interface of things, places, and people. This chapter explores this potential and focuses upon three contexts in which the technology is already operating in order to reflect upon the impact that the technology process may have upon social processes. These social processes are knowledge browsing, knowledge recovery, and knowledge sharing.

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*Darren Palmer, Deakin University, Australia*

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*Jann Karp, C.C.C. Australia, Australia*

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with truck drivers on long-haul trips. The complexities of tracking systems became more apparent as the authors listened to the men and placed their narratives in a broader context for a broader audience. The results of the work indicated that the Global Positioning System (GPS) has a role in the management of the industry as a logistics tool, but that there are limitations to the technology. The drivers use the devices and also feel the oppressive oversight when managers use the data as a disciplinary tool.

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Online behavioural profiling has now become an industry that is worth billions of dollars throughout the globe. The actual practice of online tracking was once limited to individual Websites and individual cookies. However, the development of new technologies has enabled marketing corporations to track the Web browsing activities of individual users across the Internet. Consequently, it should be no surprise that legislative initiatives are afoot throughout the world including the United States (US), the European Union (EU), and Australia. These different jurisdictions have put forward different methods of regulating online behavioural profiling and Do Not Track initiatives. Accordingly, this chapter overviews legislative developments and puts forward a typology of different legislative initiatives regarding the regulation of online behavioral profiling and Do Not Track issues. Particular focus is given to the Australian situation and whether existing Australian privacy law is sufficient to protect the privacy interests of individuals against the widespread use of online behaviour profiling tools.

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*Erica Giorda, Michigan State University, USA*

*Hilda Bouri, Michigan State University, USA*

Ubervveillance of humans will emerge through embedding chips within nonhumans in order to monitor humans. The case explored in this chapter involves the development of nanotechnology and biosensors for the real-time tracking of the identity, location, and properties of livestock in the U.S. agrifood system. The primary method for research on this case was an expert forum. Developers of biosensors see the tracking capabilities as empowering users to control some aspects of a situation that they face. Such control promises to improve public health, animal welfare, and/or economic gains. However, the ways in which social and ethical frameworks are built into standards for the privacy/access, organization, adaptability, and transferability of data are crucial in determining whether the diverse actors in the supply chain will embrace nanobiosensors and advance the ideals of the developers. Further research should be done that explores the possibilities of tripartite standards regimes and sousveillance in relation to nanobiosensors in agrifood.

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Transformations of humans through advances in bioelectronics, nanotechnologies, and computer science are leading to hybrids of humans and machines. Future brain-machine interfaces will enable humans not only to be constantly linked to the Internet, and to cyber think, but will also enable technology to take information directly from the brain. Brain-computer interfaces, where a chip is implanted in the brain, will facilitate a tremendous augmentation of human capacities, including the radical enhancement of the human ability to remember and to reason, and to achieve immortality through cloning and brain downloading, or existence in virtual reality. The ethical and legal issues raised by these possibilities represent global challenges. The most pressing concerns are those raised by privacy and autonomy. The

potential exists for control of persons, through global tracking, by actually “seeing” and “hearing” what the individual is experiencing, and by controlling and directing an individual’s thoughts, emotions, moods, and motivations. Public dialogue must be initiated. New principles, agencies, and regulations need to be formulated and scientific organizations, states, countries, and the United Nations must all be involved.

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*Ronnie D. Lipschutz, University of California, USA*

*Rebecca Hester, University of Texas, USA*

As cybersurveillance, datamining, and social networking for security, transparency, and commercial purposes become more ubiquitous, individuals who use and rely on various forms of electronic communications are being absorbed into a new type of cellular society. The eventual end of this project might be a world in which each individual, each cell in the electronic “body politic,” can be monitored, managed, and, if dangerous to the social organism, eliminated. This chapter examines the objectives, desires, and designs associated with such a cellular biopolitics. Are individuals being incorporated into a Borg-like cyber-organism in which they no longer “own” their substance, preferences, desires, and thoughts and in which they are told what they should be doing next?

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*Marcus Wigan, Oxford Systematics, Australia & Edinburgh Napier University, UK*

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# Chapter 5

## Knowledge Recovery: Applications of Technology and Memory

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### ABSTRACT

*The ability to “write” data to the Internet via tags and barcodes offers a context in which objects will increasingly become a natural extension of the Web, and as ready as the public was to adopt cloud-based services to store address books, documents, photos, and videos, it is likely that we will begin associating data with objects. Leaving messages for loved ones on a tea cup, listening to a story left on a family heirloom, or associating a message with an object to be passed on to a stranger. Using objects as tangible links to data and content on the Internet is predicted to become a significant means of how we interact with the interface of things, places, and people. This chapter explores this potential and focuses upon three contexts in which the technology is already operating in order to reflect upon the impact that the technology process may have upon social processes. These social processes are knowledge browsing, knowledge recovery, and knowledge sharing.*

### INTRODUCTION

This chapter is concerned with the implications upon the processes of storing, recalling and passing on memories as emerging digital technologies offer people the ability to associate data with physical artefacts. The network society has grown up using screens as the familiar interface with which they

are able to access digital networks. Televisions, computer screens and mobile phones have all manifested digital data behind a glass screen. As the reach of ubiquitous computing extends from urban contexts into the rural we are beginning to experience places which are always in reach of the internet, this coupled with the ever increasing range of devices that are able to access it, offers a

DOI: 10.4018/978-1-4666-4582-0.ch005

context in which we may no longer need screens to interact with the internet. Described as an Internet of Things (coined by Kevin Ashton at the Auto-ID research group at MIT in 1999 (Ashton 2009)), many new manufactured objects have barcodes or Radio Frequency Identifying (RFID) tags attached to them to allow them to be scanned and identified. In range of an RFID reader, these artefacts become part of the internet and access points to data that is associated with the object.

The emerging tendency to tag objects with RFID and barcodes that can also link to data, is accompanied with a proliferation of tag readers that are appearing as hardware and software applications on smart phones. In the hands of the public who can read these tags, objects are beginning to become interfaces to the internet.

We are interested in exploring a technology that for many years has been in the hands of check out staff of supermarkets, but one that is now available to anyone with a smart phone. Used generally to recall logistical information on a read only basis, the public have rarely understood how artefacts with barcodes were part of the internet because until now they didn't have the technology to connect their packet of breakfast cereals to the web. In addition the public presume that the only data that would be available from a barcode is likely to be logistical: name, price and weight. However, recently a series of web technologies have become available that link logistical data to identify an object with social data. Since each barcode is a signature for a product in an internationally available database, entries can also be associated with other media such as advertising media or special offers. Whilst this extends the potential for using barcodes and tags to "read" media from the internet, what is of special interest to the authors is the introduction of some systems that allow the public to "write" information themselves to a particular tag.

The ability to "write" data to the internet via tags and barcodes offers a context in which objects

will increasingly become a natural extension of the web. And as easy as the public was to adopt cloud based services to store address books, documents, photos and videos, it is likely that we will begin associating data with objects. Leaving messages for loved ones on a tea cup, listening to a story left on a family heirloom, or associating a message with an object to be passed on to a stranger. Using objects as tangible links to data and content on the internet is predicted to become a significant means of how we interact with the interface of things, places and people.

This chapter aims to introduce the varied applications and relationships of technology and memory, where knowledge is the key which links the two areas.

This is achieved in three ways. First by the introduction of the different aspects of knowledge management – that of knowledge browsing; knowledge recovery and knowledge sharing; second by a discussion of the research project "Tales of Things Electronic Memory" (TOTeM); and third to present findings of relevant case studies.

## KNOWLEDGE

In its simplest form, knowledge can be categorised as explicit or tacit knowledge. Explicit knowledge can be defined as documented knowledge whilst tacit knowledge in general is that which has not been recorded. (Ali & Ahmad, 2006; Brooking, 1996; Jain et al., 2007; Selamat & Choudrie, 2007; Zheng, 2005; Song, 2002; Kim & Lee, 2006; Brent & Vittal, 2007).

Knowledge is produced from raw information by members of a society. Society in general is organized into many different systems, (organisations), which are often controlled by technology. Within organizations knowledge systems utilize the available technology in order to undertake particular parts of the information management process – including careful planning of the way

in which the information flows within the organization structure – resulting in overall improved control of the way in which the knowledge is managed. Due to the current, continuous nature of change in organizations today, it is critical that managers are able to respond and take prompt good quality decisions. The new tagging technology we refer to in this chapter will provide a means of improving management decisions by offering a very new way of browsing, recovering and sharing information. For example, an estate agent will be able to measure the performance of property adverts in local papers by offering clients the facility to “read additional information” on a property through QR codes placed beside the property photo. The recruitment manager may be able to dramatically affect the induction process by setting up a process for leaving “hidden” memories in the form of messages embedded in QR Codes, on items in offices, such as printers, keyboards; desks; walls and on architecture, in order to speed the levels of efficiency and effectiveness, and again improve performance of the organization. The charity store manager may have the facility to personalize each donated gift through a technological facility where customers can listen to powerful memories associated with object by “reading” the QR code.

In these examples, knowledge that was tacit becomes available – available for others to browse; available as a form of recovered (known but never written) almost a type of mythological knowledge; and knowledge which is available to be shared using new forms of technology. All of these aspects are part of a broader discipline of knowledge management which can be defined as the process of locating, organising, transferring and using the information and expertise within an organisation.

There is no one formal accepted definition of KM but all definitions are concerned with information, management and some kind of system. Other standard definitions include:

*Knowledge Management is the attempt to recognise what is essentially a human asset buried in the minds of individuals, and leverage it into an organisational asset that can be accessed and used by a broader set of individuals on whose decisions the firm depends. -Prusak and Cohen (1997)*

*Any organisation that wants to excel at managing knowledge will need to do three knowledge management processes well i.e. generation, codification and transfer of knowledge. -Davenport and Prusak (2000)*

*Knowledge management is the process through which organisations generate value from their intellectual and knowledge based assets and will highlight issues concerning companies in emerging economies which could have the potential to feed into government strategy and policy. -Brown and Duguid (2000)*

All these definitions reflect societal and managerial trends at the time of writing, yet still have value today. In fact what does not change is that the knowledge management process is always supported by the four key enablers: leadership, culture, technology and measurement. Leadership in terms of managing the people within organisations; culture in terms of communicating organisational values, beliefs and assumptions; technology in terms of cost efficiency and finally process improvement and measurement in terms of increasing performance in order to successfully compete in the market place.

More formally, knowledge management can be defined as “the generation, representation, storage, transfer, transformation, application, embedding and protecting of organisational knowledge” (Schultz & Leidner, 2002) and this is the one that we consider best represents the work outlined in this chapter. The old adage that the overall success of the organisation, however, rests on one aspect, that of sharing information



is still true – but with the onset of social media and newer more accessible technologies the ways of dealing with knowledge is changing. Now it is easy to share and indeed sometimes it is difficult not to share. What has become important and what we want to introduce next is the ability to both “browse knowledge and to recover knowledge” and to show how tagging technologies can be applied in these areas.

## **KNOWLEDGE BROWSING**

The confidence to browse suggests that an individual or organisation are comfortable in a context to afford them the time to survey products, services and perhaps people with whom they would like to connect. The act of browsing also suggests an open-minded disposition that is receptive to new modes of practice and interested less in finding answers to specific questions, but to understanding novel solutions, or even opportunities of which they were previously unaware.

What is important in this technological context is that aspect of browsing which we can define as “uncertainty”. We will deal here with organisational uncertainty. Uncertainty can be viewed from two areas, that of “relational uncertainty” (according to Berger, 1975) where it is difficult for employees to predict the beliefs and behaviour of colleagues and the that of “informational uncertainty” where the accuracy of the actual information is called into question - as addressed in the information seeking literature (Burke, 2003; 2006; 2007; Choo 2001; Kuhlthau, 1993;). Both these areas are concerned with three issues. The first is the fear and trepidation experienced by organizational members about levels of accuracy and quantity of information; the second issue is about both trusting the source of the information and a willingness to trust co workers enough to share information whilst the third issue is about having sufficient relevant knowledge to make quality decisions.

Whilst tagging technologies probably at the moment cannot solve relational uncertainties, it can certainly be employed in order to assist with informational uncertainties. Let us consider the three issues previously outlined, information accuracy; trust and relevance.

Information accuracy and fears surrounding this are affected by organisational size, by culture, by industry sector and by any kind of punitive “punishment” for “getting it wrong”. If we can use tagging to enhance the process of accuracy by looking at some kind of new business process which would encapsulate knowledge – from creation, make it available for browsing for a set period of time (tagged with a quality mark) then all users would know – and trust the accuracy of the information. However, of course in doing this the danger could be the great loss of creativity and freedom to innovate ideas which had not somehow been “approved”. This of course would have to be tempered and carefully implemented as if one follows this route there is a danger of it being seen as a communist, rather than managerial ideologist.

Trust, information and organisations have always been problematic. Using social media which allow “messages” to be added and commented on, post after post, blog after blog do initiate a stronger level of comradeship and of communication. However, they are not attached to singular objects but to individual people. An organisation needs continuity and cannot change each time an employee arrives and departs. The secret success of tagging is that it is object orientated – literally. QR Codes are permanent and give out information – employees can “browse” the knowledge, at whatever time they choose.

The third issue of uncertainty is that of “relevance” - issues about how we decide if a piece of knowledge is relevant to the current task (Basden and Burke, 2004). Usually it is based on our own expertise, our own experience and whether we trust the source. By having the ability to “browse” the tales of objects and of documents, we can leave messages and build up a database of categories of

relevant information assigned to various organisational processes.

So, knowledge browsing can be enhanced by tagging technologies – it opens new avenues and allows new methods of verifying, validating and storing information.

### **Case Study One: A Contemporary Example of a Smart Phone Application that Supports the Reading of Barcodes**

Property podcast (<http://www.propertypodcast.co.uk>) is an example of a web based service for Estate Agents that links QR (Quick Response barcodes) to videos and PDF documents of houses for sale. Users may use any barcode reader application than runs on a smart phone. Upon reading a tag that may be located on a sale board outside a house or in the window of an estate agent, an internet browser will launch and play a short movie that describes the interior of the house through photographs and accompanying voice over. Like many software systems of its kind, Property Podcast allows the general public to pursue search enquiries on their terms in their own space and time without the need to go through an actual human agent. However the “knowledge” received is often an extended form of marketing and travels one way under the control of the publisher.

### **KNOWLEDGE RECOVERY: THE CONTEXT OF MEMORY**

What then is knowledge recovery – this is a new term and one that can be used to discover and recover information – to find out about memories and about identities of artefacts, to engage almost with history. This kind of knowledge is embedded personally in an individual experience and depends on other factors such as personal belief,

perspective and the value system Gourlay (2002) discovers that tacit knowledge has the identical phrase and defines it as practical know-how. It is informal rather than formal among professional groups including managers. What is particularly interesting is that new forms of digital technology are being used to enhance this process. For example, the web site [talesofthings.com](http://talesofthings.com) which allows users to record a “tale” about any object and to upload to a database is a form of both knowledge sharing and knowledge recovery.

As individuals we are able to share with relative ease – however this becomes more problematic for us as we spend most of our lives dealing with or as part of organisations which operate within an ever changing external environment How then, can knowledge recovery – both implicit and explicit be enhanced through digital technology? We may start to approach this problem by analysing types of societies. This may be helpful as it allows us to consider the aspect of sharing information and the management of knowledge from quite different perspectives than technology and sociology. For example, Van der Rijta’s (2007) work was concerned with the two concepts of societies which displayed characteristics associated with individualism and collectism. These types of societies are important and means of charting differences in the concept of sharing (Chen et al., 2001; Hofstede & Hofstede, 2005).

### **Case Study Two: An Example of the use of Barcode Scanning that Offer Multi-Dimensional Enquiry and the User More Choice**

Snap Tell smart phone application: Snap Tell is an example of one of many smart mobile phone applications that integrate a series of digital technologies to allow users speedy access to best price options and geographic knowledge about books, music CD’s and DVD’s. The Snap Tell application

allows the user to take a photograph of a book cover (for example) using the built in camera of a smart phone. The application then uses image recognition technology to find matches between the photograph and products by communicating with online databases. Once a match is identified, the software presents prices of where the book may be bought at online stores such as Amazon and Overstock, as well as offering prices at actual shops in the local vicinity. The location function is limited to the United States however the integration of photographic technology, image recognition software, database interrogation and geographic services transforms the traditional relationship between knowledge management and shoppers as they are presented with this new data. No longer are consumers restricted to acquiring knowledge from “experts” who are in the immediate vicinity, the tag (in this case the book, CD or DVD cover) is a conduit to an internet of data that, if organised well, can offer multiple access routes to information and knowledge.

## KNOWLEDGE SHARING

Sharing generally happens within the context of an information system or a knowledge management system. Yet the popularity and availability of social media sites has made “sharing” a much more social activity.

Sharing in organisations only takes place where there is trust and where there is a shared feeling of ownership of goals. The reasons behind the tendency to share are based on the kind of interpersonal relations between co-workers inherent within the organisation and the effects of social relationships on organisational teams. Strengthening the social relationships between individuals in the team is crucial in motivating team members to share knowledge.

The current thinking in the research community about knowledge sharing within organisations is

that barriers to knowledge sharing can be classified into individual barriers, organisational barriers and technology barriers. The UK has a rich array of examples where attention has been paid to knowledge management initiatives in order to set up major knowledge management systems, e.g. the Health Service and Banking sectors. Although these have not always been wholly successful, UK Companies have taken up the ideas of knowledge management and have endeavoured to identify and overcome barriers to sharing. (Wong & Aspinall, 2005). Of particular interest is the work by Elenurm, T. (2004) who looked at knowledge sharing capabilities and knowledge development needs in the context of East-West technology.

However, in order for even the most basic KM system to work effectively, as we have seen previously, there must be a sense of trust in the organization and this trust is crucial to the open sharing of information. Sharing only takes place where there is trust and where there is a shared feeling of ownership of goals. Within a business, this is often done through a framework of knowledge sharing networks. For example, Dyer and Nobeokai's (2000) work on the Toyota's network can be seen is a purely classical way as having solved

*three fundamental dilemmas of knowledge sharing by (1) motivate members to participate in knowledge sharing, (2) reduce the barriers to knowledge sharing (while maintaining the competitive advantage of the organization), and (3) reduce the barriers to knowledge sharing (while maintaining the competitive advantage of the organization). Toyota has done this by creating a strong network identity with a focus on knowledge sharing and entry into the network. Knowledge production knowledge is viewed as the property of the network.*

Does this work ok?

it seems to me that the quote might be better if it simply flowed from the sentence.

IE. having solved three fundamental rather than a separate quote.

Yet knowledge sharing in business is also about social relationships and tagging technologies can enhance social relationships by accentuating that relationship rather than, or as well as, the business relationship.

### **Case Study Three: An Example of a Scanning Platform that Allows the user to Not Only Read Information from a Source but also to “Write Back” and Contribute to Database**

Tales of Things self tagging service: Tales of Things (<http://www.talesofthings.com>) is a web-based application that is able to associate different media types to a unique two-dimensional barcode. Members of the “free to use” system are able to submit an object to the online database with a photograph and other information: name/title, keywords, location and most importantly a story that the object evokes for them. The interface also requests for other media to be associated with the artefact: sound and video clips of the owner telling a story about the object that are stored on services such as YouTube and AudioBoo. Once submitted, the Tales of Things system creates a unique two-dimensional barcode (QR Code) for the artefact which can also be printed out and attached to the object.

Tales of Things also provides mobile applications for Android and iPhone platforms that allow the user or more importantly, anyone who comes across an object tagged with a Tales of Things code, the opportunity to scan and retrieve stories, video and audio clips. The same phone applications also allow people to add additional stories to the artefact using text and video and thus contribute to the objects history. Tales of Things offers a unique social and storytelling focus for both the browsing and sharing of knowledge. This is in stark contrast to the current deployment of tagging technology that often focuses upon providing consumers with marketing material about products and offers no portal through which they can feedback.

## **CONCLUSION**

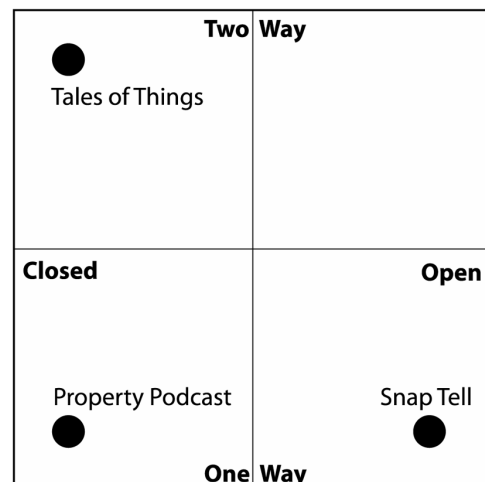
In many ways the order that we have used to describe the three opportunities for knowledge that is associated with objects, follows the order in which individuals have learnt to interact with the internet:

1. Recalling data is akin to basic web searches,
2. Knowledge browsing represents a confidence of the user to look through web based media at their leisure, and
3. Knowledge sharing implies a further confidence to post and distribute media for others to search and browse.

The three case studies demonstrate the multi-dimensional properties of acquiring and sharing knowledge through the relatively new technology of public bar code scanning:

1. **One-Way, Closed Media Channel:** QR codes are becoming a popular interface to recall marketing material however this is limited to a specific service and is edited by the provider.

*Figure 1. Burke and Speed's Tagging Media Matrix (2011)*



2. **One-Way, Open to More Media Channels:** QR codes and other forms of tags are associated with one product but an intermediary service offers the user multiple choices about where the product may be bought and at different prices.
3. **Two-Way, Closed Media Channel:** An emerging characteristic of tagging may be the ability to “write-back” to the database that a tag is associated with. Whilst this service is extremely limited at present for tags, just like the emergence of Web 2.0 technologies the public are now familiar with the ability to comment and contribute to the internet. However due to the nature of the research project to record the memories associated with a single item, the database is closed and only includes items that are within its own database.

The Tagging Media Matrix (Figure 1) presents the difference between the three case studies and acknowledges a fourth space in which a technical platform may offer an open and two-way platform in which the public are able to explore multiple knowledge sets through a tag, but are also able to contribute to the knowledge. This is the initial introduction of this model – further work will follow on this in later publications.

The concept of knowledge sharing is inevitably difficult to define, as it covers such a wide range of the “newer” disciplines including information sharing; information systems; knowledge management and enterprise and innovation. If relevant business knowledge is shared in an appropriate manner it can lead to major competitive advantage and in turn new developments which will assist the industry and in turn affect the economy of the country. However, what has been obvious so far in this research is the clear energy, passion and commitment to bringing the latest ideas to their enterprise, regions and ultimately

their countries. It is interesting to consider the different perspectives which are taken when sharing information is a new factor. New models and frameworks need to be devised in order to incorporate changed societal and organizational culture. Whether the future for the development of Knowledge Management is sustainable is still to be seen, but from the evidence there is certainly both growth and hope in the area. No doubt the final way forward will depend on two factors - the cooperation of relevant bodies and the appropriate resources being made available, and the take up of the new technology by business organisations and the wider society. It is hoped that now, today in the freedom of the 21st century both these factors can be given reasonable consideration and a positive response.

## ACKNOWLEDGEMENT

The Tales of Things project is supported by a Digital Economy, Research Councils UK grant, and made “real” by our team: Barthel, R., Blundell, B., Burke, M.E., De Jode, M., Hudson-Smith, A., Leder, K., Karpovich, A., Manohar, A., Lee, C., Macdonald, J., O’Callaghan, S., Quigley, M., Rogers, J., Shingleton, D. and Speed, C.

## REFERENCES

- Ali, H. M., & Ahmad, N. H. (2006). Knowledge management in Malaysian banks: A new paradigm. *Journal of Knowledge Management Practice*, 7(3).
- Ashton, K. (2009). That ‘internet of things’ thing. *RFID Journal*, 22.
- Barclay, R. O., & Murray, P. C. (1997). *What is knowledge management*. Retrieved from [www.media-access.com/whatis.html](http://www.media-access.com/whatis.html)



- Basden, A., & Burke, M. (2004). Towards a philosophical understanding of documentation: A Dooyeweerdian framework. *The Journal of Documentation*, 60(4), 352–370. doi:10.1108/00220410410548135
- Berger, C. R. (1975). Beyond initial interaction: Uncertainty, understanding and the development of interpersonal relationships. In H. Giles, & R. St Clair (Eds.), *Language and social psychology* (pp. 122–145). Oxford, UK: Blackwell.
- Brent, M. H., & Vitall, S. A. (2007). Knowledge sharing in large IT organisations: A case study. *VINE: The Journal of Information and Knowledge Management Systems*, 37(4), 421–439.
- Brooking, A. (1996). *Intellectual capital*. London: International Thomson Business Press.
- Brown, J. S., & Duguid, P. (2000). *The social life of information*. Cambridge, MA: Harvard Business Press.
- Burke, M. (2003). Philosophical and theoretical perspectives of organization structures as information processing systems. *The Journal of Documentation*, 59(2), 131–142. doi:10.1108/00220410310463482
- Burke, M. (2006). Achieving information fulfilment in the networked society: Part 1: Introducing new concepts. *New Library World*, 107(9/10), 21–26. doi:10.1108/03074800610702624
- Burke, M. (2007). Cultural issues, organizational hierarchy and information fulfilment: An exploration of relationships. *Library Review*, 56(8), 236–245. doi:10.1108/00242530710818018
- Chen, C. et al. (1998). How can cooperation be fostered? The cultural effects of individualism-collectivism. *Academy of Management Review*, 23(2), 285–304.
- Choo, C., et al. (2001). Environmental scanning as information seeking and organizational learning. *Information Research*, 7(1).
- Davenport, T., & Prusak, L. (2000). *Working knowledge: How organisations manage what they know*. Boston: Harvard Business School Press.
- Davenport, T. H. (1993). *Process innovation: Re-engineering work through information technology*. Cambridge, MA: Harvard Business School Press.
- Dyer, J. H., & Nobeoka, K. (2000). Creating and managing a high-performance knowledge-sharing network: The Toyota case. *Strategic Management Journal*, 21, 345–367. doi:10.1002/(SICI)1097-0266(200003)21:3<345::AID-SMJ96>3.0.CO;2-N
- Elenurm, T. (2007). *Entrepreneurial knowledge sharing about business opportunities in virtual networks*. Paper presented at the 8<sup>th</sup> European Conference on Knowledge Management. Barcelona, Spain.
- Forrester, J. (1965). *Industrial dynamics*. Cambridge, MA: MIT Press.
- Gourlay, S. (2001). Knowledge management and HRD. *Human Resource Development International*, 4(1), 27–46. doi:10.1080/13678860121778
- Hofstede, G., & Hofstede, G. J. (2005). *Cultures and organisations: Software of the mind*. London: McGraw Hill.
- Jain, K. K., Manjit, S. S., & Gurvinder, K. S. (2007). Knowledge sharing among academic staff: A case study of business schools in Klang Valley, Malaysia. *Journal of the Advancement of Science and Arts*, 2, 23–29.
- Kim, S., & Lee, H. (2006, May/June). The impact of organizational context and information technology on employee knowledge-sharing capabilities. *Public Administration Review*, 370–385. doi:10.1111/j.1540-6210.2006.00595.x
- Kulthau, C. (1993). A principle of uncertainty for information seeking. *The Journal of Documentation*, 49(4), 39–55.



Prusak, L., & Cohen, D. (1997). Knowledge buyers, sellers and brokers: The political economy of knowledge. In *The economic impact of knowledge*. New York: Butterworth-Heinemann.

Schultze, U., & Leidner, D. (2002). Studying KM in IS research: Discourses and theoretical assumptions. *Management Information Systems Quarterly*, 26(3), 213–242. doi:10.2307/4132331

Selamat, M. H., & Choudrie, J. (2007). Using meta-abilities and tacit knowledge for developing learning based systems: A case study approach. *The Learning Organization*, 14(4), 321–344. doi:10.1108/09696470710749263

Song, S. (2002, Spring). An internet knowledge sharing system. *Journal of Computer Information Systems*, 25–30.

Storey, J., & Barnett, E. (2000). Knowledge management initiatives: Learning from failure. *Journal of Knowledge Management*, 4, 145–156. doi:10.1108/13673270010372279

Van der Rijta, P. (2007). *Precious knowledge: Virtualness and the willingness to share knowledge in organisational teams*. University van Amsterdam.

Wong, K. Y., & Aspinwall, E. (2005). An empirical study of the important factors for knowledge management adoption in the SME sector. *Journal of Knowledge Management*, 9(3), 64–82. doi:10.1108/13673270510602773

Zheng, W. (2005). A conceptualisation of the relationships between organisational culture and knowledge management. *Journal of Information and Knowledge Management*, 4(2), 113–124. doi:10.1142/S0219649205001110

## KEY TERMS AND DEFINITIONS

**Knowledge:** Can be implicit or explicit and pertains to familiarity with someone or something. These include: facts, information, descriptions, or skills acquired through experience or education. Knowledge is different to both data and information.

**Knowledge Management:** Is a system of strategies and practices typically used in an organisation to identify, create, represent, share, and enable adoption of insights and experiences.

**Knowledge Sharing:** Is an activity through which knowledge (i.e., information, skills, or expertise) is exchanged among people, communities, or organizations.

**Memory:** In psychology, memory is the three-step process in which information is encoded, stored, and retrieved.

**Organisation Structure:** Consists of activities such as task allocation, coordination and supervision, which are directed towards the achievement of organizational aims. Some organisational structures are flat, while others are hierarchal such as in bureaucracies.

**QR Code:** Quick Response Code is the trademark for a type of matrix barcode (or two-dimensional barcode) first designed for the automotive industry in Japan.

**Storage:** In essence our memory, a psychological and physiological process that takes place in the human brain. In computer hardware we refer to data storage devices.

**Tag:** A tag usually is used to identify an object or a subject using a unique identifier. For example the dog tag is used to identify military personnel, and ear tags are used to identify animals and pets.

**Trust:** Reliance on another person or entity.